truncatus. *Linn. Gmel.* 3008. no. 64; *Manuel, Enc. Méth.* vii. 733. t. 268. f. 30—34; *Fabricius, Ent. Syst.* 498.—Lynceus truncatus, *Latreille, Hist. gén. des Crust.* 206; *Baird, Trans. Berw. Nat. Club*, p. 100; *M. Edwards, Hist. des Crust.* iii. 388.

Shell nearly of an oval form; the lower extremity having a curved projection backwards, and provided with a number of pretty strong spines, about seventeen in number, the three last of which are curved backwards. On the upper extremity of anterior margin there are about an equal number of spines, the upper ones being curved upwards. These are partly concealed by the cilia which densely cover the anterior margin of the shell. The shell is striated longitudinally. Beak rounded and sharp-pointed, rather long. Rami short; anterior branch furnished with five setæ, one from first, one from second, and three from last articulation. Posterior branch has three setæ, all from last joint. First pair of feet large. Tail rather gibbous on lower edge, and on latter half has about eight spines, and terminates in two stout claws. Intestine convoluted, having one turn and nearly a half. Antennæ conical-shaped. Eye areolar. Accompanying black spot squarish-shaped. Two ova.

Hab. Pond at Osterly Park; ditch near Richmond opposite Isleworth church; near Southall; "pond on Beaumont water at Yetholm."—*Trans. Berw. Nat. Club.*

XVI.—*Observations on the Formation of the Pitted Tissue of Plants, with one or two remarks on the Analogy between the Blood-discs in Animals and the Starch Particles in Vegetables.* By John Wm. Griffith, M.D., F.L.S. &c.

[With a Plate.]

The object of the present remarks is to point out the mode of formation of the dotted tissue of plants, the cause of the peculiar arrangement of the dots, &c. I shall also allude to one or two points of vegetable anatomy in which my observations differ from those of authors generally. It is well known that the dotted or pitted tissue varies very much in its characters; sometimes the dots are surrounded by a rim, in other varieties the pits or dots are without it. My observations will apply at present to the latter variety only*; the cause of the rim surrounding the dot in the former variety is, I think, quite unexplained. The explanation advanced by Dr. Willshire†,

* The dot, or elliptical thinner portion of the marking of the dotted duct (i. e. the part generally within the rim), I think is formed in the same manner as the dots on the spiroid tissue, but I know of no explanation of the origin of the rim.

† Annals of Natural History, Aug. 1842.

who considers them formed by spaces left between filaments "not only having a spiral direction with respect to the duct in which they are formed, but bent upon themselves forming sinuous curves," I have not been able to verify. The fibres here spoken of, although I have carefully sought for them, I have never been able to perceive. Moreover, Dr. Willshire does not attempt to account for the dot. Dr. Martin Barry* has also advanced a theory of the formation of what he has termed dotted ducts, but by reference to his figure it will be perceived that he alludes to that variety which has no rim, and which, according to Hugo Mohl's definition, is not the real dotted duct. He says, "the spirals in vegetables are produced in the same manner as the muscular fibres (of animals). Were the division of the spiral, or at least the separation, to be complete in some parts and not in others, the appearance would resemble that denominated the reticulated duct, and the tendency (as it is supposed) of vegetable fibre to anastomosis might be explained†." By acting upon a spiral vessel with a spirituous solution of corrosive sublimate, Dr. Barry produces what he terms a double spiral, whose coils appear to interlace, and by their close contact to produce the appear-

* Trans. of Royal Society of London, 1842, Part I.

† Through the kindness of Dr. M. Barry I have examined his preparations exhibiting the interlacement of double spirals; but, although the appearance presented in one or two of them is exactly similar to that which would be seen when a fibre formed in the manner described by him, and of the same size as his, was examined under the microscope, nevertheless there are one or two points which strongly militate against the idea of their being really double spirals. In one beautiful preparation made by Professor Sharpey from the tadpole, the upper portion of one of the fibrillæ exhibited an apparent interlacement most distinctly, so much so, that I am sure no prejudiced eye even could have viewed this alone without coming to the conclusion that it was formed in the manner described by Dr. Barry. But upon viewing the fibre lower down, the interlacing appearance was replaced by that of a rope wherein the fibres all took one oblique direction, leaving spaces between them. When this lower part was carefully brought in and out of focus, at first the oblique portions of fibre above described were seen, but afterwards no alteration would bring into focus the posterior portions of the coil, which satisfactorily convinced me that they were really not spiral fibres. When we examine spirals, however minute, from vegetables under the microscope, we can first bring into focus the upper portion of the coils, and then by depressing the object-glass distinctly perceive the lower; but in the case of the specimen spoken of this could not be done. I cannot help believing that in this lower portion the fibre really has separated into discs, whose edges give the peculiar rope-like appearance; but I cannot explain the cause of the peculiar appearance of the upper portion. The fact of the fibres of muscles splitting into discs, is, I think, a proof that they cannot be spirals. To break up into discs, the fibrillæ must be weaker in one portion than another, and I have no doubt this weak part is opposite the dark line on the fibrils, where they are thinnest; but I do not believe the fibrils are beaded, I think they are merely transversely thinned opposite the dark portions, and that the beaded appearance is an optical illusion.

ance of transverse and elliptical pores and dots. The apparent pores or dots he believes to be no other than the spaces between the winds of spirals contained within a tube. This theory appears to me totally inadequate to anything like a true explanation of the phænomena. In all dotted vessels, (excluding the true dotted ducts of Mohl, not alluded to by Dr. Barry,) traces of spiral formation or spiral fibre in some forms may always be met with; these vessels usually uncoil spirally, and when torn across, the dots appear as spaces between the projecting teeth of the fibres. The fibres, according to my observations, never run longitudinally to the axis of the containing tube, but always spirally. Therefore, if such be the case, the two interlacing fibres composing the compound spiral must leave spaces whose axes are nearly parallel to the axis of the vessel, and therefore the dots ought to be nearly parallel to the same axis. But that such is not the case, I need not say. The views of Dr. Barry then are not consistent with experience, at least on the formation of dotted tissue. The tissue of which I speak is, I think, generally acknowledged as a modification of true vascular tissue. The dots or pits are formed by spaces left between the fibres but covered by the membrane, so that the wall of the tube opposite the dots is formed by membrane alone; this may always be found in the younger tissue, but in the older tubes the membrane disappears, leaving them porous. These tubes are very common in Endogenous plants, herbaceous Exogens, and Ferns; they are often mixed with spiral vessels and sometimes annular ducts. In some of the lower plants (*Equiseta*, &c.) where these are afterwards found, they appear preceded by annular ducts only, spiral vessels being comparatively rare; whilst in others, as Ferns, annular ducts are very rare, and the remains of the spiral fibre may always be found. In the higher plants we find them in all the stages of development. They are more abundant in the older than in the younger plants. The cause of the transformations from spiral vessels, and the regularity of arrangement of the dots of these tubes, depend entirely upon the pressure of the surrounding parts. Mohl has shown that this is the case with the true dotted ducts, and I am convinced that it is the case with the tubes now under consideration; but I believe that the arrangement of the dots of one tube opposite those of the next is not constant. When a spiral vessel has formed in a young plant, the rapid growth of the stem induces considerable pressure of the surrounding parts; the consequence is, that the convexity or parts of the surrounding vessels or cells opposite to the spiral vessel are pressed firmly against it, whilst opposite the intercellular and intervascular spaces the pressure is much less; thus the fibre within the compressed spiral is bent into as many sides as there are surrounding and pressing vesicles or vessels. This is illustrated in fig. 14; accordingly, if the spiral fibre be examined at this period it will be found bent as above mentioned, and the natural curve of the fibre straightened. Opposite the intercellular or intervascular spaces, *i. e.* at the bendings of the fibres, the latter become firmly adherent to the membrane, thickened and united to the fibres above and below. These thickened portions form the line of space running between the rows of dots. The dots themselves are formed by the spaces left between the portions of the fibres opposite the convexity of the surrounding cells and vessels. Thus, when we examine the tubes at this stage, we find the membrane and fibre united so firmly that they are with great difficulty separated. The vegetable substance which fills up the intercellular spaces often also becomes firmly adherent to the membrane and fibre, so that when we dissect out these tubes from the surrounding parts we often find the remains of adherent portions which existed opposite the intercellular spaces; therefore the number and arrangement of the dots must depend entirely upon the surrounding vessels and cells. When the compressing and compressed tubes are equal in size, the dots extend nearly across the face or opposed side of the tube; and when several small tubes and vessels compress a spiral so as to convert it into a dotted tube, the dots will be small and numerous. The observation of Schleiden, that, "in consequence of the deposition of formative substance, the pore appears the rounder the more the cell is developed," is, I think, incorrect—I believe the reverse to be correct. The examination of the young and old stems of any plant containing these vessels will prove this. If the fibre be separated from the surrounding parts in the early stages, it will be found bent and thickened at the bendings; and oftentimes we can find portions of membrane &c. adhering as above mentioned. These vessels are generally observed in plants whose growth is rapid, so that in the older stems we cannot expect to find the arrangement persistent; but in a large number of plants it can readily be perceived, especially where the formation has not been completed. We can now readily account for the impression of a small tube sometimes observed as imprinted on a larger one; the black lines running between the dots and separating their rows is also readily explained. In making careful transverse and oblique sections of stems of the above-mentioned plants, we can readily perceive the appearances sketched in Pl. IV. fig. 5, where *a* represents the rows of dots corresponding to the projecting portion of the cell opposed to the forming tube. The bent appearance of the fibre within the tube gives the prismatic or angular appearance to many of these tubes, so readily perceived when two vessels press against each other. In some few cases a large number of very small cells appear to act in compressing as a single large one. When I first noticed the transitions above described I imagined they were confined to the Ferns only, but I have since found them applicable to all the plants above enumerated. A very common cause of the beaded appearance on the margins of tubes viewed under the microscope is their longitudinal section, so that the projecting extremities of the cut fibres produce the peculiar appearance of beads.

I cannot refrain here from making a few observations on the remarks made by Dr. Willshire* relative to the function of some starch particles, or of starch particles existing in the laticiferous vessels. He says, "Dr. Barry has demonstrated the existence of primordial fibre or filament in bodies of animal organization, and we shall endeavour to draw an analogy between some of his views with phænomena known to exist in the vegetable kingdom." I think, that before any analogy be attempted to be drawn, the basis of that analogy ought to be established: this has certainly not been done in the present instance. The appearances observed by Dr. Barry in the blood, are, I think, totally misinterpreted; and I am happy to find Dr. Willshire comparing the fibre of the blood-disc to a dark line on a piece of starch, for I am convinced that it is not a fibre at all. I believe the appearance alluded to is in all cases produced after the vitality of the blood is destroyed, and is dependent on physical causes alone for its production. The blood-discs are sacs containing the colouring matter of the blood and a liquid, which is most probably the same as the liquor sanguinis. Dr. Barry says, "the filaments may be discerned without any addition whatever, *if the coagulation has begun*, provided its appearance be familiar," &c. I believe that the sac is generally cracked at the time of the production of the fibre, and the contents coagulated, either by the causes producing the ordinary coagulation of the blood, or by the imbibition of a portion of corrosive sublimate when that is used. Moreover, I am at a loss to understand how the "fibre" is primary or primordial. Dr. Barry says, "in the mature blood-corpuscle there is often to be seen a flat filament or band already *formed* within the corpuscle." "This filament is formed of the discs within the corpuscle." So that here we should have the discs performing the part of cytoblasts to the blood-corpuscle or cell, as in vegetables; and the fibre must be secondary, not primary.

I think we are bound to believe that the appearances ob-

* Annals of Nat. History, *loc. cit.*

servable in spiral vegetable fibres, mould, &c., simulating doubly interlacing spirals, are produced by the action of the corrosives employed, as these are not observable without their use; moreover, it is difficult to imagine that the walls of the cells of the lowest vegetable productions in the scale of organization should be formed of spiral fibres, and a complexity of arrangement which seems almost exclusively to belong to the higher plants; nor do I believe that nature in her constant simplicity would ever make use of so truly artificial an arrangement. A common appearance of double interlacement in muscular fibre results from the apposition of two fibres with oblique striæ, as in Mr. Bostock's preparations. As regards the existence of primary fibre in vegetables, I think no such productions exist. I am at a loss to conceive how the arrangement of particles about to form a fibre can be produced without their being enclosed within a sac filled with a fluid to allow of free motion of the particles. Were the spiral fibres cells, they might possess the power of growth by elongation, or formation of budding cells, &c. from the extremity of the old ones; but this is not the case, they are always solid. Moreover Mr. Quekett* has seen and described their mode of formation, and I am not aware of, neither do I believe in, the existence of any other mode than that described by him. The tissue of *Stelis,* brought by Meyen from Luçon, in which cells exist apparently formed of fibres only, ought to be referred to that variety described by Slack† where the membrane and fibre have been firmly consolidated. And the fibres on the testa of *Collomia* I am convinced are surrounded by a true cylindrical membrane with as defined an outline as that of any spiral vessel; the only difference between these fibres and their membrane, and those of ordinary spiral vessels is, that in the former the membrane is never in approximation with the fibre, but distended with mucus, and their termination is not in a point as in ordinary spiral vessels; but the fibre breaks up into distinct rings, and I believe they are mere modifications of the spiral vessels similar to those on the testa of *Ruellia* and *Acanthodium,* &c.

The regularity of the relation of the fibre to the sheath in *Collomia* is much too constant to be regarded as simply mucus. In vegetable cells approaching nearest to those described by Meyen where the fibre apparently forms the entire cell, careful examination will nearly always detect evidences of the existence of both fibre and membrane. I think the great cause of "primary vegetable fibre" being found, is the tissue being examined in much too advanced a state. I feel author-

* Transactions of Microscopical Society, vol. i. 1842.

† Transactions of Soc. of Arts, vol. xlix.

ized in drawing from the above considerations the following conclusions:—

1st. That the uniform dotted arrangement on the walls of the vasa spiroidea simply results from the pressure of the surrounding parts alone.

2nd. That the supposition of the starch particles being analogous in function to the blood-globules is unfounded; and that the black line seen upon the starch particles cannot, and does not, perform any such office as has been supposed.

3rd. That the imagined secondary formations from the blood-corpuscles are really misinterpreted appearances; not vital but physical*.

9 St. John's Square, Dec. 1842.

EXPLANATION OF PLATE IV.

Fig. 1. Vessel from *Typha latifolia*, showing the dots extending nearly across the face of the tube from the pressure of one large similar tube or cell.

Fig. 2. Origin of beaded appearance, *i. e.* the fibres cut across and projecting. (*T. latifolia.*)

Fig. 3. Same as 1 and 2. On the tube *b* two smaller tubes have pressed, whilst opposite *a* only one has existed. (*T. latifolia.*)

Fig. 4. Tube from *Arundo Phragmites*, showing the results of the pressure of two of different sizes on one tube.

Fig. 5. From *Aspidium Filix mas*, a transverse section showing the dots opposite the convexity of the projecting cells.

Fig. 6. Projecting teeth, leaving spaces between them corresponding to the dot. (*T. latifolia.*)

Fig. 7. Section of tube of the same, showing the dot to be formed of membrane only.

Fig 8. Ring of an annular duct of *Arundo Phragmites*, which has been pressed upon by three surrounding cells or vessels, thickened at the bendings.

Fig. 9. Tube from *Pteris Aquilina*, showing the impression of one tube upon another, and the dots on that portion corresponding to its breadth.

Fig. 10. From *Typha*, showing adhering portions of surrounding cells or vessels.

Fig. 11. Section of stem of *Typha*: cells similar to those at *a*, pressing upon and producing large dots; those similar in size to *b*, *b* produce smaller ones, as at *c*. The interruptions to the regular arrangement, as at *e*, are caused by the abrupt terminations of the surrounding tubes, leaving spaces.

Fig. 12. Tube from *Typha*, showing the loose fibres bent and thickened at the joints.

Fig. 13. Diagram showing the spiral fibre pressed upon by surrounding vessels or cells, first stage.

Fig. 14. Second stage. *a*, *a*, *a*, *a*, bendings of fibres corresponding to intercellular or intervascular spaces; *b*, pressing cells.

Fig. 15. Muscular fibre, showing what might be interpreted into an appearance of interlacing fibres when not quite in focus. (Bostock, Barry in Trans. of Royal Soc.)

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* I believe the tissues to be all reproduced by the transudation of the liquor sanguinis through the walls of the capillaries; and that no blood-globules can ever leave the capillaries unless their walls be ruptured, which must always be the case in hæmorrhage by "simple exudation."

Fig. 16. Interlacing double spirals, leaving spaces which afterwards become dots. (After Barry.)
Fig. 17. Same in a more advanced stage. (Id. *loc. cit.*)
Fig. 18. Dotted duct thus perfected. (Barry, *loc. cit.*)
Fig. 19. Fibres from *T. latifolia* bent and thickened, in an advanced stage.
Fig. 20. Dotted vessel from *Arundo Donax,* the black lines formed by adherent portions of vegetable matter which filled up the spaces separating the surrounding cells and vessels.
Fig. 21. Dotted duct from *Sambucus nigra.*
Fig. 22. Transverse section of dotted tube in *Aspidium Filix mas,* showing the rows of dots corresponding to projecting portions of surrounding cells.

XVII.—*The Crustacea of Ireland.* By Wm. Thompson, Esq., Vice-Pres. Nat. Hist. Society of Belfast.

[Continued from vol. x. p. 287.]

Order Decapoda.

2nd Section. Decapoda Anomoura.

Lithodes Maia, Leach, Mal. pl. 34.
L. arctica, *Edw. Crust.* t. ii. p. 186; *Desm. Consid. Crust.* p. 160. pl. 25.
Horrid Crab, *Penn. Brit. Zool.* vol. iv. p. 6. pl. 8. f. 14, edition 1812.

Templeton says of this species—" Found on the coast of the county Wexford: a specimen thence is in Trinity College Museum [Dublin]. It is called by the people *craban.*"

I have not seen any Irish example of this crab, but am indebted to Dr. Wylie of Ballantrae, Ayrshire, for a very fine specimen which was taken in a herring-net there in the summer of 1838, in water from twenty to thirty fathoms in depth. It was brought to Dr. Wylie by the fishermen as a species which they had never before met with.

Pagurus Bernhardus, Edw. Crust. t. ii. p. 215; Penn. vol. iv. p. 30. pl. 18; Desm. p. 178. pl. 30. f. 2.
P. streblonyx, *Leach, Mal.* pl. 26. f. 1—4.

Hermit-crabs of this species are very common in univalve shells around the coast of Ireland. Leach mentions their " first occupying the shells of the common periwinkle or trochus" (Art. Crustaceology in Edin. Encyclop.); but some examples in my collection are much smaller than those contained in the species just named. They are in the *Littorina retusa, Turritella terebra,* and *Nasa macula*—univalves from this size up to that of the largest *Buccina* are commonly inhabited by the *P. Bernhardus*: a specimen of this crab from the coast of Down, in my collection, is $6\frac{1}{2}$ inches in length. Samouelle speaks of the shell occupied by the *Pagurus* being " destined to preserve the body from injury, and to guard them from the attacks of fishes, which would otherwise devour them." Entom. Compend. p. 92. In this latter respect the shells are of little service, as I have remarked *Paguri* very commonly in the stomachs of various species of fishes, but especially in the omnivorous and voracious cod: all the moderate-sized and large hermit-crabs which have thus occurred to me